

16th.—A heavy gale prevailed along the New Jersey and southern New England coasts. During the evening a snow-storm set in over east-central New York.

19th.—At San Francisco, Cal., the pressure decreased rapidly until noon, with light rain at intervals. About 9.30 a. m. (local time) a house was demolished, and a street car was overturned by a whirl or strong gust of wind in the western part of the city; the wind velocity at the Weather Bureau office was 27 miles per hour from the west at that hour, the highest noted for the day.

20th.—High south to west gales prevailed on the Washington coast and in the Straits, and a general snowstorm was reported throughout southern British Columbia.

21st.—A wind and snow storm extended over eastern Washington. A heavy wind and rain storm set in at night over northwestern Washington. At Salt Lake City, Utah, a snowstorm, with heavy gusts of wind, which commenced the morning of the 20th ended 11.45 a. m. Severe storms occurred in South Dakota, Nebraska, and Iowa; snow falling in South Dakota; rain, sleet, and snow in Nebraska; and thunderstorms, with rain and sleet, in Iowa.

22d.—Heavy westerly winds continued on the coasts of northwest Washington. At Newport, Oregon, windows were reported broken by concussion during an unusually violent thunderstorm.

23d.—High westerly winds continued on the Washington coast. At Upper Lake, Cal., a heavy windstorm from the northwest occurred in the early morning. A severe storm prevailed over Louisiana, Mississippi, and Alabama. In northern Louisiana the rainfall measured 4.00 to 6.00. At Meridian, Miss., rain fell in the evening; the wind veered from southeast to south, with a maximum velocity of 38 miles per hour, and an extreme velocity of 60 miles at 8.26 p. m., causing damage to fences and trees. At Mobile, Ala., a windstorm began suddenly at 7.50 p. m., with light rain; the electric-light tower in Washington square was blown down.

24th.—At Chattanooga, Tenn., a heavy wind and rain storm occurred in the early morning; the wind reached a velocity of 36 miles per hour from the south, causing damage to roofs, trees, etc. A general and heavy snowstorm prevailed over the Dakotas. At Cheyenne, Wyo., snow began in the early morning, with high north wind.

25th.—A heavy snowstorm prevailed over Nebraska and western Iowa, interrupting traffic. A northwest gale, with snow, was reported at Duluth, Minn., in the evening. Snow was also reported in Oregon and Washington east of the Cascade Mountains.

26th.—Heavy gales occurred on the coast of Washington. Heavy snow and wind storms prevailed in eastern Oregon and northeastern California. At Eureka, Cal., a severe rainstorm set in during the evening, and rain and high winds continued at that place until the 31st. At Cheyenne, Wyo., heavy northwest winds were destructive to buildings, etc. At Buffalo, N. Y., a severe gale began 11.35 a. m.; the wind reached a velocity of 66 miles per hour at 1.56 p. m.; rain fell in the morning, and snow flurries occurred in the afternoon.

27th.—At Salt Lake City, Utah, the wind increased in force in the evening, with sleet, changing to heavy snow; snow fell throughout the night, delaying trains, etc. At Lander, Wyo., the wind shifted to southwest in the morning and reached a velocity of 50 miles per hour. At Fort Assinaboine, Mont., high southwest wind and snow began about noon. The lowest barometer on record at that station, 29.04 (reduced), was noted at the 8 a. m. observation.

29th.—Severe storms prevailed on the north Pacific coast, over parts of the middle Rocky Mountain region, in Tennessee, and along the Atlantic coast from the Carolinas northward. At Olympia, Wash., rain, with high southwest winds, continued throughout the day. At Aberdeen, Wash., the wind reached a velocity of 40 miles per hour from the southwest in the afternoon, causing unusually high tide. At Walla Walla, Wash., the wind reached a velocity of 45 miles per hour from the southwest, and an extreme velocity of 60 miles. High wind, with light rain, prevailed at Roseburgh, Oregon. At Astoria, Oregon, an unusually violent southwest gale, with light rain, began the night of the 28th and continued during the early morning of the 29th, wrecking buildings, uprooting trees, etc. The pressure fell from 29.74 at 4.40 p. m., 28th, to 28.92 at 4.30 a. m., 29th.

At McMinnville, Oregon, a furious gale during the early morning caused considerable damage of a minor character. At Salinas, Cal., the rainfall during the 28th and 29th was exceptionally heavy. Heavy drifting snow interrupted railroad traffic in the mountains of Colorado and northern New Mexico. During a heavy thunderstorm at Nunnely, Tenn., the wind, reached a velocity of 40 miles per hour from the south. At Raleigh, N. C., a thunder and rain storm advanced from the southwest about 6.40 p. m., with heavy thunder and lightning for 20 minutes. Lightning struck a barn on the North Carolina Experiment Station farm, one mile west of Raleigh; the barn and adjoining stables were burned and 2 mules were killed. Heavy rain and thunder storms occurred in eastern Virginia in the evening, and high winds prevailed along the New Jersey and New England coasts.

30th.—A heavy wind and rain storm prevailed over New England and along the Atlantic coast to Hatteras, N. C., causing considerable damage. A severe wind and snow storm occurred over northern Utah.

31st.—At Abilene, Tex., a thunderstorm advanced rapidly from the west at 6.30 p. m., with rain, hail, and high wind reaching a velocity of 48 miles per hour. Rain and hail continued 10 minutes, the hailstones being small, and the temperature fell 20° during the storm. At Gallinas, Tex., a heavy black cloud and frequent flashes of lightning were observed in the west and northwest about 8 p. m. As the storm approached brisk south winds were succeeded by strong gusts from the northwest, with light rolling thunder. At Gainesville, Tex., buildings were damaged by high winds. A severe storm was reported at Marksville, La., in the evening. A thunderstorm occurred at Atchison, Kans. High winds prevailed along the New England coast. Heavy southerly winds were reported on the Washington coast.

INLAND NAVIGATION.

ICE IN RIVERS AND HARBORS.

The Penobscot River was reported closed by ice at Bangor, Me., on the 18th.

The Connecticut River was frozen over for the first time this season at Middletown, Conn., on the 18th.

Large quantities of ice were reported in the Hudson River at Albany, N. Y., on the 17th, and on the 20th ice 2 to 3 inches in thickness was reported between Albany and Hudson, N. Y.

Floating ice was reported in the Detroit River on the 18th, 19th, 21st, and 30th.

The Grand River was closed by ice at Lansing, Mich., on the 7th, open on the 14th, closed on the 18th, and open on the 22d.

A rapid rise in the Black River caused the ice to break up at Black River Falls, Wis.; timber and piling of a railroad bridge in course of construction were carried away and other damage caused.

Mississippi River.—On the 5th the ice on Lake Pepin was 8 inches in thickness, and teams were crossing. At Red Wing, Minn., the ice broke up during the early morning of the 14th;

the river was frozen on the 17th; ice broke up on the 21st; river frozen over on the 26th. At La Crosse, Wis., the river was rising and the ice disappearing on the 14th; 15th, river almost clear of ice; 23d, river clear of ice. On the 14th the river was clear of ice at Dubuque, Iowa, and was frozen on the 26th. At Davenport, Iowa, the ice ran out on the 4th; 7-8th, river full of floating ice; 9th, river clear of ice; 12-13th, river full of floating ice; 25th to 28th, river full of floating ice.

Missouri River.—At Pierre, S. Dak., the river was frozen over until the 20th, when open water appeared in places. At Yankton, S. Dak., the river was frozen over on the 25th. At Sioux City, Iowa, small quantities of ice were running on the 11th; ice was also running on the 12th, 14th, and 15th. At Leavenworth, Kans., floating ice was noted on the 7th, 8th, 26th, and 27th.

CLOSING OF NAVIGATION.

Navigation on the Erie Canal at Albany, N. Y., closed on the 5th. At Oswego, N. Y., navigation on Lake Ontario closed on the 28th; the harbor was open but no freight was offered. At Buffalo, N. Y., navigation was practically closed on the 14th. At Cleveland, Ohio, marine insurance expired on the 5th; many vessels continued their trips, however. Navigation closed at Toledo, Ohio, on the 9th. A report from Port Huron, Mich., states that the Fort Gratiot Light was discontinued for the season on the 12th; that ice was floating in the Black River from the 17th to 21st; and that navigation at that port was closed for the season on the 22d. Navigation was reported closed for the season at Sault de Ste. Marie, Mich., on the 8th; at Marquette, Mich., on the 2d; at Manistee, Mich., on the 17th; at Milwaukee, Wis., for all regular steamers, on the 10th; and at Duluth, Minn., on the 7th.

Heights of rivers above low-water mark, December, 1891 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River.</i>						
Shreveport, La.	29.9	26	7.9	3	—1.6	9.5
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	24	3.6	2, 3	1.5	2.1
Little Rock, Ark.	23.0	26	7.9	2	3.8	4.1
<i>Missouri River.</i>						
Fort Buford, N. Dak. * ..						
Sioux City, Iowa *	18.7					
Kansas City, Mo.	21.0	27	6.4	12	4.0	2.4
<i>Mississippi River.</i>						
Saint Paul, Minn. *	14.0					
La Crosse, Wis. *	11.8					
Dubuque, Iowa *	16.0					
Davenport, Iowa †	15.0	28	3.3	5	0.1	3.2
Keokuk, Iowa *	14.0	30, 31	2.0	8	—1.4	3.4
Saint Louis, Mo.	30.0	26	5.7	6	2.3	3.4
Cairo, Ill.	40.0	31	21.3	23	11.8	9.5
Memphis, Tenn.	33.0	31	14.6	12, 13, 25	9.3	5.3
Vicksburg, Miss.	41.0	31	15.5	1	4.8	10.7
New Orleans, La.	13.0	17	4.2	1	2.3	1.9
<i>Ohio River.</i>						
Parkersburg, W. Va.	38.0	29	17.8	14	8.0	9.8
Cincinnati, Ohio.	45.0	31	27.2	21	12.4	14.8
Louisville, Ky.	24.0	31	11.1	22	6.5	4.6
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	31	21.0	22, 23	3.7	17.3
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	10	10.9	4	2.8	8.1
Knoxville, Tenn.	29.0	9	7.0	3	1.3	5.7
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	6	15.8	16	3.8	12.0
<i>Savannah River.</i>						
Augusta, Ga.	32.0	6	11.2	3	7.2	4.0
<i>Willamette River.</i>						
Portland, Oregon.	15.0	30	12.8	1	4.6	8.2
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	7	9.6	4	3.6	6.0
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	9	8.2	3	1.1	7.1

* Frozen. † For 27 days.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were reported as follows: 3d, Montevideo, Minn. 6th, Alta and Cresco, Iowa; Cornish, Me.; in Michigan; Pine River, Minn.; Grand Rapids, N. Dak.; Webster, S. Dak.; Medford, Wis. 7th, Riley, Ill.; Alta and Delaware, Iowa; Cornish, Me.; Concord and Newburyport, Mass.; Fort Assinaboine and Miles City, Mont.; Bismarck and Fort Buford, N. Dak.; Castlewood and Kimball, S. Dak. 9th, Orono and State College, Me.; Fort Assinaboine, Mont.; Webster, S. Dak. 11th, Fort Assinaboine, Mont. 12th, Cornish, Me. 19th, Woodbridge, S. Dak. 20th, Fort Buford, N. Dak. 22d, in Arkansas. 27th, Alpena, Mich.; Selins Grove, Pa. 28th, Selins Grove, Pa. 29th, in Michigan; Webster, S. Dak.; Barron and Embarrass, Wis. 30th, in Arkansas. 31st, University, Miss.

THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states,

14, on the 29th; in 11 on the 31st; in 10 on the 3d; in 9 on the 2d; in 8 on the 6th; in 7 on the 24th; in 6 on the 21st; in 5 on the 4th, 14th, and 23d; in 4 on the 7th, 22d, 28th, and 30th; in 3 on the 1st, 4th, and 13th; in 2 on the 25th; and in 1 on the 8th, 10th to 12th, 15th, 19th, 20th, and 27th. No thunderstorms were reported on the 9th, 16th to 18th, and 26th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 13, in Texas; on 10 in Iowa; on 8 in Kansas and Missouri; on 7 in Mississippi; on 6 in Nebraska and Wisconsin; on 4 in Illinois, Indian Territory, and Virginia; on 3 in Alabama, Arkansas, Georgia, Indiana, Louisiana, and Pennsylvania; on 2 in Delaware, Maryland, Michigan, Minnesota, New Jersey, North Dakota, and West Virginia; and on 1 in Florida, Kentucky, New York, North Carolina, Ohio, and South Carolina.

West of the Rocky Mountains thunderstorms were reported in New Mexico on the 12th; in Oregon on the 2d, 8th, 16th, 22d, and 24th; in Utah on the 1st; and in Washington on the 1st, 7th, and 8th. In states and territories other than those named no thunderstorms were reported.

MISCELLANEOUS PHENOMENA.

DROUGHT.

At Manchester, N. H., the heavy rains of the last 9 days of the month broke the drought which had prevailed in that region since September, and enabled mills and factories to resume operations with full water power. Although abundant rains fell generally over New York, streams and wells in the northern part of the state were very low at the close of the month. During the first half of the month the drought was very severe about Charleston, S. C., and in the interior of the state water was very scarce, and cotton and other products

were injured. The rains of the middle part of the month were reported of great benefit to farmers in the region about Red Wing, Minn.; the fall had been very dry, a large number of wells had failed, and water for stock had to be hauled from the rivers and streams. The drought at San Antonio, Tex., was reported broken on the 12th. Heavy rain at Tucson, Ariz., on the 24th broke a drought that had continued about 3 months. A report from San Diego, Cal., dated the 11th, stated that rain was badly needed, and that the ground was too hard and dry to plow. The drought in that section was broken by rain the latter part of the month.